Anatomy and Physiology 121: Tissues

Four types: Epithelial (covering)
Connective (support)
Muscle (movement)
Nervous (control)

Tissue defined:

Histology defined:

Epithelial tissue characteristics:
- Cellularity
- specialized contacts
- polarity
- supported by connective
- innervated but avascular
- regenerative

Functions:
- protection, absorption, filtration, excretion, secretion, sensory reception

Epithelium = sheet of cells that covers a body surface or lines a body cavity.

Occurs as: a. covering and lining epithelium
b. glandular epithelium

Classification of Epithelium:

A. Layers
- Simple epithelium
- Stratified epithelium

B. Shape
- Squamous cells
- Cuboidal cells
- Columnar cells

C. Major Classes of Epithelium
1. Simple squamous epithelium
    a) endothelium: lining for lymphatic and vascular vessels, heart
    b) mesothelium: serous membranes
2. Simple cuboidal epithelium

3. Simple columnar epithelium
    a) microvilli on apical surface for digestion
    b) goblet cells that secrete a protective mucous
    c) some are ciliated
4. Pseudostratified columnar epithelium
5. Stratified squamous epithelium
    a) outer layer of skin *keratinized*, keratin in cells
    b) rest of epithelium non-keratinized
6. Stratified cuboidal and columnar epithelium (rare)
7. Transitional epithelium (only in urinary organs)

D. Glandular Epithelium

Gland = one or more cells that make and secrete a product

Two types:

a) endocrine = secrete products internally
b) exocrine = secrete products onto body surfaces

Connective Tissue Characteristics:

- common origin
- degrees of vascularity
- extracellular matrix
- very few cells

Functions:

- binding and support, protection, insulation, transportation

Found everywhere in the body, most abundant tissue

Structural Elements of Connective Tissue:

a) Ground substance
b) Fibers
    1. collagen fibers (white fibers)
    2. elastic (yellow fibers)
    3. reticular
c) Cells (undifferentiated)
    1. fibroblast
    2. chondroblast
    3. osteoblast
    4. hemocytoblast
d) Other cells in matrix
    1. fat cells
    2. macrophages
    3. plasma cells

Types of Connective Tissue:
Three factors determine connective tissue type

1. cell types
2. fiber types
3. proportion that is matrix

I. Connective tissue proper: main connective tissue, two subclasses

1. Loose connective tissue (areolar, adipose, reticular)
2. Dense connective tissue (dense regular, dense irregular, elastic)

II. Cartilage: between dense con. and bone, surrounded by perichondrium, main cell type chondroblasts
cartilage growth

1. Interstitial growth
2. Appositional growth

Chondrocytes = mature cartilage cells, found in hollow cavities in cartilage called *lacunae*

Three types of cartilage:

1. Hyaline cartilage: gristle, main cartilage in body
2. Elastic cartilage: external ears, epiglottis
3. Fibrocartilage: vertebral discs

III. Bone (osseous tissue)

- has inorganic calcium-phosphate salts
- osteoblasts
- osteoclasts
- osteocytes

IV. Blood: major transport vehicle for the body

Nervous Tissue:
Where: brain, spinal cord, nerves

Function: regulate and control body functions

Cell Types: Two

1. *Neurons* = cells that generate and conduct impulses
2. *Neuroglia* = supporting cells, nonconducting, protect and insulate neurons

Muscle Tissue Characteristics:

- highly cellular
- elongated, tapered shape
- possess *myofilaments* made of actin and myosin
- well-vascularized
- cells called muscle fibers

Function: movement and protection

Three Muscle Types:

1. Skeletal muscle
    - long, cylindrical
    - multinucleated
    - striated
    - responsible for voluntary, gross movement of body
2. Cardiac muscle
    - found only in heart
    - striated
    - uninucleated
    - cells branching, fit together at *intercalated discs*
3. Smooth muscle
    - non-striated
    - spindle shaped
    - uninucleated
    - involuntary movement of substances in the body
    - viscera, uterus, blood vessels